yil

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/965,644	09/27/2001	Mark W. Bitensky	S-092701	3052

50607 7590 04/27/2005

RONALD I. EISENSTEIN
100 SUMMER STREET
NIXON PEABODY LLP
BOSTON, MA 02110

EXAMINER	
STRZELECKA, TERESA E	

ART UNIT	PAPER NUMBER
1637	

DATE MAILED: 04/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/965,644	BITENSKY ET AL.
	Examiner	Art Unit
	Teresa E. Strzelecka	1637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2004 and 08 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) *19-46* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1. This case was transferred to examiner Teresa Strzelecka in Art Unit 1637 since examiner Spiegler left the USPTO.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 10 and December 8, 2004 has been entered.

3. Claims 1-46 were previously pending, with claims 19-46 withdrawn from examination. Applicants amended claims 1, 2, 4 and 18. Claims 1-18 will be examined.

4. Applicants' arguments with respect to prior art are addressed in the "Response to Arguments" section below.

Response to Arguments

5. Applicant's arguments filed November 10 and December 8, 2004 have been fully considered but they are not persuasive.

A) Regarding the rejection of claims 1-18 under 35 U.S.C. 102(b) as anticipated by Sutton et al., Applicants argue the following:

a) Applicants' instrument is designed to enable morphological measurements of a large number of cells in a rapid manner, whereas the instrument of Sutton et al. is designed to measure a velocity of a cell as it moves through a microchannel, and is not designed to capture cells.

b) Applicants amended claims 1 and 2 to better describe the channels and the array.

c) Microchannels of Sutton et al. are not arranged to form a gradient, and Applicants point to Figure 2 of the application to indicate that the array of Fig. 2 has a series of increasingly smaller channels. Applicants further argue that the array of Sutton et al. is not designed to allow the cells to enter multiple channels sequentially or to trap the cells.

d) Applicants argue that Sutton et al. do not teach wedge-shaped channels.

Regarding a), as stated by MPEP 2114:

MPEP 2114

APPARATUS CLAIMS MUST BE STRUCTURALLY DISTINGUISHABLE FROM THE PRIOR ART

While features of an apparatus may be recited either structurally or functionally, claims< directed to >an< apparatus must be distinguished from the prior art in terms of structure rather than function. >*In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971);< *In re Danly,* 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original).

MANNER OF OPERATING THE DEVICE DOES NOT DIFFERENTIATE APPARATUS CLAIM FROM THE PRIOR ART

A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) (The preamble of claim 1 recited that the apparatus was "for mixing flowing developer material" and the body of

> the claim recited "means for mixing ..., said mixing means being stationary and completely submerged in the developer material". The claim was rejected over a reference which taught all the structural limitations of the claim for the intended use of mixing flowing developer. However, the mixer was only partially submerged in the developer material. The Board held that the amount of submersion is immaterial to the structure of the mixer and thus the claim was properly rejected.).

Therefore, it is clear from the above that Applicants' limitation of " the microchannel is designed to use its shape as a geometric constraint to trap said cell as it traverses the microchannel, such that the trapped cell does not leave the microchannel but is constrained by its shape to remain in the microchannel" of claim 1 constitutes a manner of operating the device, but does not result in a structural difference between the claimed device and the prior art, since Sutton et al. also teach microchannels with entry and exit ports, and with channel dimension within the ranges specified by Applicants. Applicants' claim that the microchannels are used for static measurements are contradicted by claims 15 and 16, drawn to means of moving the cells through the microchannels.

Regarding b), amendment to claim 1 introduced only one structural feature, i.e., the presence of an entry portion and an exit portion, which is anticipated by Sutton et al.

Regarding c), Applicants did not define the term "gradient array". An embodiment presented in Fig. 2 is described on page 6 of the specification as follows:

"Referring to Fig. 2, an example of a HEMA 10 is a gradient array 20. Gradient array 20 has a plurality of microchannels 22. Each microchannel 22 has a width w, a length, l, and a depth d (see Fig. 3a). While depth d preferably remains constant throughout gradient array 20, both width w and length l may be varied among the microchannels 22. Note that, for gradient array 20, each individual microchannel 22 will have constant dimensions.

Preferably, gradient array 20 also has rows of similarly shaped microchannels 22. For example, gradient array 20 may have two rows, indicated as 28 and 29. Row 28 has microchannels 22a with a first microchannel width, which is larger compared to the width of microchannels 22b in row 29. Note, however, that the number of microchannels, the number of rows, and the arrangement thereof is not limited by the examples being shown to illustrate the present invention."

Therefore, a gradient array may refer to any arrangement of microchannels with the same or different dimensions. The array in Fig. 2 is a particular embodiment of a gradient array, and even this embodiment does not require different channel dimensions, for example. Further, Applicants do not claim the array of claim 2, but any gradient array. The limitation of claim 2, "whereby said sets of microchannels are arranged to form a gradient for capturing said cell" is, again, an intended use limitation.

Regarding d), the limitation of wedge-shaped channels is addressed in the rejection below.

B) Regarding the rejection of claims 1-18 under 35 U.S.C. 102(b) as anticipated by Brody et al., Applicants argue that Brody et al. do not teach an array for capturing cells. This argument was addressed above. Applicants further argue that Brody et al. do not teach a configuration of microchannels with decreasing width, designed to capture the red blood cell and block its movement through the array. However, Brody et al. do teach configuration of microchannels with decreasing width (see Fig. 1, for example), and the function performed by these channels is not relevant as long as the structural features are anticipated.

The rejections are maintained in a restated form.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-18 are indefinite in claim 1. Claim 1 is indefinite over the recitation of "wherein each individual microchannel includes an entry portion for receiving said cell and an <u>exit channel</u> that said cell may pass through" (lines 2 and 3, emphasis added). It is not clear what is an "exit channel" in a microchanel.

Claim Interpretation

8. The limitation of claim 1 "the microchannel is designed to use its shape as a geometric constraint to trap said cell as it traverses the microchannel, such that the trapped cell does not leave the microchannel but is constrained by its shape to remain in the microchannel" constitutes a manner of operating the device, therefore it is not taken into account when comparing the claimed subject matter with prior art (see MPEP 2114 cited above).

9. The limitation of claim 2 "said array is designed as a gradient array" has not been defined by Applicants, therefore any arrangement of microchannels is considered to be a "gradient".

10. Applicants did not define a numerical range for the term "about" with respect to channel dimensions, therefore any dimensions within reasonable numerical value difference from the given dimension will be considered as anticipating the particular dimension.

11. Applicants did not define the terms "safety channels" or "shunt channels", therefore any channel is considered to anticipate these limitations.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Sutton et al. (Microvascular Res., vol. 53, pp. 272-281, 1997; cited in the previous office action).

Regarding claim 1, Sutton et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 274, fifth paragraph).

Regarding claim 2, Sutton et al. teach an array consisting of groups of six channels, each having a width between 3.0 and 4.0 μm in 0.2 μm increments and a constant depth of 3.2 μm (Fig. 1; page 278, second paragraph). As can be seen in Fig. 1, there are 24 microchannels on the array, therefore, there are four channels in each width group, anticipating the limitations of at least first and second set of microchannels with different cross-sectional areas, since differences in width at constant depth result in different cross-sections of the channels.

Regarding claim 3, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the ranges of depth being between 0.8 to 6 μm, length of about 10 to about 210 μm, an entry portion with width of about 2.5 to about 25 μm and an exit width of about 0.5 to about 7 μm.

Regarding claim 4, Sutton et al. teach channels with stepped widths (page 280, second paragraph), therefore they teach wedge-shaped channels.

Regarding claims 5-8, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the ranges of depth being about 3.4 μm (claim 5), length about 60 μm (claim 5), about 35 μm (claim 6), about 100 μm (claim 7) and about 16 μm (claim 8), an entry

portion with width of about 3.7 μm (claim 5), about 3.6 μm (claims 6 and 8), about 4.5 μm (claim 7) and an exit width of about 1.5 μm (claims 5 and 7) and about 1.4 μm (claims 6 and 8).

Regarding claims 9 and 10, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), in fluid communication with each other, anticipating the length of about 0.5 to about 30 μm, and width of about 0.5 to about 1.5 μm.

Regarding claim 11, Sutton et al. teach microchannels designed for constant pressure flow (page 275, fifth paragraph).

Regarding claims 12 and 13, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the length of about 10 to about 100 μm.

Regarding claim 14, Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph) designed to deform the cells as they pass through them (Fig. 5; page 280, second paragraph).

Regarding claim 15, Sutton et al. teach a microfluidic system for moving the cells through microchannels (page 275, paragraphs 2-4; Fig.3).

Regarding claim 16, Sutton et al. teach a pump for driving the cells through the channels (page 275, fourth paragraph).

Regarding claim 17, Sutton et al. teach microchannels with dimensions on the same scale as human capillaries (Abstract; page 280, fifth paragraph).

Regarding claim 18, Sutton et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 274, fifth paragraph). Sutton et al. teach microchannels with a depth of 3.2 μm, width between 3.0 and 4.0 μm in 0.2 μm increments and length of 100 μm (Fig. 1; page 278, second paragraph), anticipating the ranges of length of about 40 to about 100 μm, an entry portion with width of about 3 to about 9 μm and an exit width of about 0.5 to about 2 μm.

14. Claims 1-3, 5-15, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Brody et al. (Biophysical J., vol. 68, pp. 2224-2232, 1995; cited in the previous office action).

Regarding claim 1, Brody et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 2225, ninth paragraph).

Regarding claim 2, Brody et al. teach an array consisting of groups of four channels, each having a width between 2.5 and 4.0 μm in 0.5 μm increments and a constant depth of 4 μm (Fig. 1; page 2225, ninth paragraph). As can be seen in Fig. 1, there are eight microchannels on the array, therefore, there are two channels in each width group, anticipating the limitations of at least first and second set of microchannels with different cross-sectional areas, since differences in width at constant depth result in different cross-sections of the channels.

Regarding claim 3, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the ranges of depth being between 0.8 to 6 μm, length of about 10 to about 210 μm, an entry portion with width of about 2.5 to about 25 μm and an exit width of about 0.5 to about 7 μm.

Regarding claims 5-8, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the ranges of depth being about 3.4 μm (claim 5), length about 60 μm (claim 5), about 35 μm (claim 6), about 100 μm (claim 7) and about 16 μm (claim 8), an entry portion with width of about 3.7 μm (claim 5), about 3.6 μm (claims 6 and 8), about 4.5 μm (claim 7) and an exit width of about 1.5 μm (claims 5 and 7) and about 1.4 μm (claims 6 and 8).

Regarding claims 9 and 10, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), in fluid communication with each other, anticipating the length of about 0.5 to about 30 μm, and width of about 0.5 to about 1.5 μm.

Regarding claim 11, Brody et al. teach microchannels designed for constant pressure flow (page 2225, eighth paragraph).

Regarding claims 12 and 13, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the length of about 10 to about 100 μm.

Regarding claim 14, Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph) designed to deform the cells as they pass through them (Fig. 2; page 2224, last paragraph).

Regarding claim 15, Brody et al. teach a pressure gradient system for moving the cells through microchannels (Fig. 1 and Fig. 3).

Regarding claim 17, Brody et al. teach microchannels with dimensions on the same scale as human capillaries (Abstract; page 2224, first paragraph).

Regarding claim 18, Brody et al. teach an array comprising a plurality of microchannels, where each channel includes an entry portion and an exit portion (Fig. 1; page 2225, ninth paragraph). Brody et al. teach microchannels with a depth of 4.0 μm, width between 2.5 and 4.0 μm in 0.5 μm increments and length of 20 μm (Fig. 1; page 2225, ninth paragraph), anticipating the ranges of length of about 10 to about 60 μm, an entry portion with width of about 3 to about 6 μm and an exit width of about 0.5 to about 2 μm.

15. No claims are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Teresa E. Strzelecka whose telephone number is (571) 272-0789. The examiner can normally be reached on M-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (571) 272-0782. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TERESA STRZELECKA
PATENT EXAMINER
Teresa Strzelecka

April 21, 2005